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# BMJ Open

## **Attitudes of university students aged 18-24 years towards New Zealand's Smokefree 2025 Goal: Results of a 2018 cross-sectional survey.**

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# Title page

**Title:** Attitudes of university students aged 18-24 years towards New Zealand's Smokefree 2025

**Goal:** Results of a 2018 cross-sectional survey.

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**ABSTRACT**

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**Objective**

In March 2011, New Zealand (NZ) launched an aspirational goal to reduce smoking prevalence to 5% or less by 2025 (the Smokefree 2025 goal). However, little is known about the awareness of, support for, and perceptions about this goal. We sought to narrow the knowledge gap.

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**Setting**

University students in NZ.

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**Methods**

We analysed data from a 2018 cross-sectional survey of university students across NZ. The sample was weighted by gender and university size to improve its representation of the general university student population. Chi-squared tests were used to compare responses by age, gender, ethnicity and smoking status. Confidence intervals (95% CI) were reported where appropriate.

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**Participants**

The sample comprised 1,476 students: 919 (62.3%) aged 18-20, 557 (37.7%) aged 21-24 years; 569 (38.6%) male, 907 (61.4%) female; 117 (7.9%) Māori, 1,359 (92.1%) non-Māori; 10.5% currently smoked (i.e. smoked at least monthly) and 6.1% currently vaped.

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**Results**

Awareness of the goal was 47.5% (95% CI: 44.9-50.1); support 96.9% (95% CI: 95.8-97.8); belief that it can be achieved 88.8% (95% CI: 86.8-90.7) and thoughts that e-cigarettes/vaping can help achieve it 88.1% (95% CI: 86.0-89.9).

The awareness was stronger in smokers than non-smokers; support was stronger in younger than older participants and in non-smokers than in smokers; belief that the goal can be achieved was stronger in females than in males and in non-smokers than smokers, and thoughts that e-cigarettes/vaping can help achieve the goal were stronger in non-smokers than in smokers.

## Conclusions

The results suggest strong support for the Smokefree goal; belief that it can be achieved, and that e-cigarettes/vaping can help achieve it, despite low awareness among our sample. Follow-up data will help to identify ways to increase its awareness and potential benefits to public health.

## Strengths and limitations of this study

- This is the first study in NZ to assess the Smokefree 2025 goal: awareness, support, achievability and role of e-cigarettes/vaping, in university students.
- The sample was weighted to improve its representation of the general university student population.
- There are two main limitations of this study. Firstly, its non-random sample, which may have exposed it to increased risk of volunteer bias. This bias could lead to underestimation or overestimation of the reported results. Secondly, there is great potential for overlap between smokers and vapers. Some smokers could also be vapers, or they could be non-vapers, and some non-smokers could be vapers. However, investigating the extent of the overlap between smoking and vaping would be difficult because majority of vapers also smoke.

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INTRODUCTION

Smoking is a leading cause of preventable death and illness in New Zealand (Aotearoa New Zealand or NZ).<sup>1</sup> Smoking also contributes to inequalities in health and wellbeing between Māori (the Indigenous people of NZ) and non-Māori.<sup>2</sup> Furthermore, the economic consequences of smoking are significant<sup>3</sup> and have a huge impact on society, particularly on the poor. For these reasons, tobacco control has been a major social and health policy in NZ.

In March 2011, the NZ Government adopted the Smokefree Aotearoa 2025 goal (Smokefree 2025 goal or Smokefree goal), which aims to reduce the prevalence of smoking to 5% or less by the year 2025.<sup>4</sup> This goal was in response to the recommendations of a landmark Parliamentary inquiry into the tobacco industry in NZ and the consequences of tobacco use for Māori.<sup>4</sup>

Literature on the Smokefree goal (awareness, support, perceptions on its achievability, and the potential role of e-cigarettes or vaping) is lacking. Available data comes from the 2018 Youth Insights Survey (YIS), which included 2,758 Year 10 students (predominantly ages 14 and 15 years) from across the country.<sup>5</sup> The YIS forms part of the New Zealand Youth Tobacco Monitor (NZYTM), a collaborative effort by the Health Promotion Agency (HPA) and Action on Smoking and Health (ASH).<sup>6</sup>

The 2018 YIS data show that 45% of students were aware of the Smokefree goal, but significant disparities were present across the predominant ethnic groups.<sup>5</sup> Students who identified as NZ European/Other were more likely to be aware of the Smokefree goal, while Pacific students were less likely to be aware of the goal. Eighty percent of the students supported the goal, with higher support among non-Māori and non-Pacific (82%) compared with Māori (72%) and Pacific (67%) students.<sup>5</sup> The report used prioritised ethnicity: each participant was assigned to a single ethnic group based on the

ethnicities that they identified with, in the prioritised order of Māori, Pacific, Asian and European/Other.<sup>5</sup> Support for the goal was higher in females than males (83% vs. 78%), never smokers than ex-smokers and current smokers (86% vs. 69% and 32%), and students attending high decile (86%) and medium decile (80%) schools, compared with those at low decile schools (70%).<sup>5</sup> School deciles are a measure of the socio-economic position of a school's student community relative to other schools throughout the country, for example, decile 1 schools are the 10% of schools with the highest proportion of students from low socio-economic communities, whereas decile 10 schools are the 10% of schools with the lowest proportion of these students.<sup>7</sup>

Smoking prevalence data show that in 2018, 5.0% of Year 10 students smoked daily, weekly, or monthly (i.e. currently smoked) and 1.9% smoked daily<sup>8</sup>, while recent data show that 11.1% of university students aged 18-24 years were current smokers and 5.9% daily smokers in 2018.<sup>9</sup>

The current paper examines the awareness of, support for, and perceptions of university students aged 18-24 on NZ Government's Smokefree 2025 goal. This goal is an essential component of NZ health policy and it is hoped that our findings will provide vital data that could assist policymakers in tobacco control in NZ and beyond.

## METHODS

### Survey and Participants

We analysed data from the first (baseline survey) of two cross-sectional surveys of NZ university students as part of the lead author's PhD thesis. The baseline survey was conducted in March 2018 and all students enrolled at NZ's eight universities were eligible to participate. Detailed information about the survey, sample and procedures used, is described elsewhere.<sup>9</sup> A total of 1,476 participants met the



1 criteria for inclusion in the current study (i.e. they were enrolled at an NZ university in March 2018 and  
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3 were aged 18-24 years) and data on their demographic information and Smokefree 2025 questions were  
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5 extracted from the data file and analysed.  
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10 **Patient and public involvement**

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12 No patients were involved in this project.  
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17 **Survey measures**

18 Demographic variables:

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20 Gender-specific analyses included only those who identified as male or female. Ethnicity data were  
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22 prioritised for Māori: all those who selected Māori were defined as Māori and those who did not select  
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24 Māori were defined as non-Māori, similar to previous research.<sup>5</sup> Years lived in NZ (five or less) was  
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26 used as proxy for international students, based on our previous work.<sup>9</sup> Participants could select one or  
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28 more of the eight universities in NZ: Auckland University of Technology (AUT), Lincoln University,  
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30 Massey University, University of Auckland, UC, University of Otago, University of Waikato and  
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32 Victoria University of Wellington (VUW). This variable helped us to assess the representativeness of  
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34 the sample based on university size.  
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42 The Smokefree 2025 Goal:

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44 A brief description of the Smokefree 2025 goal was provided before the first question that asked, ‘The  
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46 New Zealand Government wants to reduce the proportion of people who smoke from around 16% (1 in  
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48 6) currently to less than 5% (1 in 20) by 2025. This is the Smokefree 2025 Goal. Before today, were  
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50 you aware of this goal?’. The response options were: ‘Yes’ and ‘No’. This question has been validated  
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52 previously.<sup>10, 11</sup>  
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Participants were also asked: ‘Do you support this goal?’; ‘Do you think this goal can be achieved’, and ‘Do you think e-cigarettes/vaping can help achieve this goal?’. The response options for the three questions were as follows: ‘Definitely yes’; ‘Somewhat yes’; ‘Not really’; ‘Definitely not’, and ‘No opinion’. These were later grouped into two levels as: ‘Definitely/somewhat yes’ and ‘Other’. ‘Other’ included those who said not really, definitely not and no opinion. The response options were grouped into two levels because of small numbers for the responses included in ‘Other’.

### Tobacco use:

Participants were asked: ‘Which of the following best describes how often you smoke cigarettes or tobacco now?’, with the following response options: ‘At least once a day’; ‘At least once a week’; ‘At least once a month’, and ‘Less often than once a month’. Those who reported smoking at least once a month or more frequently were defined as current smokers. This question was adapted from Marsh *et al.*<sup>12</sup> and the NZ Tobacco Use Survey.<sup>13</sup>

### E-cigarette use (vaping):

Participants were also asked about their e-cigarette use with the following question: ‘How often do you currently use an e-cigarette or vaping device?’. The response options were: ‘Daily or almost daily’; ‘Less than daily, but at least once a week’; ‘Less than weekly, but at least once a month’; ‘Less than monthly’; ‘Not at all’, and ‘Don’t know’. Those who reported vaping at least once a month or more frequently were defined as current vapers. The question was adapted from Pearson and others.<sup>14</sup>

## **Data analysis**

Chi-squared tests were used to compare the awareness of, and thoughts about the Smokefree goal, by age (18-20 vs 21-24), gender (male vs female), ethnicity (Māori vs non-Māori), and smoking status (current smokers vs non-current smokers). Non-current smokers included participants who never smoked and those who smoked less than once a month. All statistical analyses were performed using

1 IBM SPSS Statistics 25 and two-sided  $p<.05$  was considered statistically significant. 95% CIs were  
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4 reported where appropriate.  
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8 **RESULTS**  
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11 Table one shows the characteristics of the sample, which comprised 1,476 students: 919 (62.3%) were  
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13 aged 18-20, 557 (37.7%) aged 21-24 years; 569 (38.6%) male, 907 (61.4%) female; 117 (7.9%) Māori,  
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15 1,359 (92.1%) non-Māori; 78.9% had lived in NZ for six years or more; 10.5% currently smoked, and  
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17 6.1% currently vaped. Table two compares the characteristics of participants included in this paper with  
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19 those of the 2018 NZ university student population.  
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Table 1. Demographic characteristics of participants	
Variable	Sample (n = 1,476) %
<b>Age</b>	
18-20 years	919 (62.3)
21-24 years	557 (37.7)
<b>Gender</b>	
Male	569 (38.6)
Female	907 (61.4)
<b>Ethnicity</b>	
Māori	117 (7.9)
Non-Māori	1,359 (92.1%)
<b>Years lived in NZ</b>	
<6 years	307 (20.8)
≥6 years	1,471 (78.9)
Missing data	5 (.3)
<b>University</b>	
AUT*	59 (4.0)
Lincoln University	64 (4.3)
Massey University	165 (11.2)
University of Auckland	306 (20.7)
University of Canterbury	243 (16.5)
University of Otago	258 (17.5)
University of Waikato	142 (9.6)
VUW**	246 (16.7)
<b>Currently smoke</b>	
Yes	155 (10.5%)
No	1321 (89.5%)
<b>Currently vape</b>	
Yes	90 (6.1%)
No	1386 (93.9%)

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\*Auckland University of Technology. \*\*Victoria University of Wellington.

<b>Table 2. Characteristics of students in this study vs NZ university students in 2018.</b>			
		<b>This paper (%)</b>	<b>NZ university student population (%)*</b>
Student type	Domestic	79.2 <sup>a</sup>	82.0
	International	20.8 <sup>a</sup>	18.0
Ethnicity	Māori	7.9	9.6
	Non-Māori	92.1	90.4
Gender	Male	38.6	41.8
	Female	61.4	58.2

<sup>a</sup>We used the time lived in NZ as proxy for defining domestic students (having lived in NZ for  $\geq 6$  years) and international students

(having lived in NZ for  $< 6$  years). \*Source: Ministry of Education.<sup>15</sup> Data extracted from Excel sheets ENR.31, ENR.32 and ENR.34.

## Overall awareness and thoughts

Among those who responded, 684 (47.5%, 95% CI: 44.9-50.1) were aware of the Smokefree goal before completing the survey (97.6% response rate); 1309 (96.9%, 95% CI: 95.8-97.8) supported it (91.5% response rate); 923 (88.8%, 95% CI: 86.8-90.7) thought it can be achieved (70.4% response rate), and 967 (88.1%, 95% CI: 86.0-89.9) thought e-cigarettes/vaping can help achieve it (74.4% response rate).

## Awareness and thoughts, by age

Participants aged 18-20 were more likely than participants aged 21-24 to support the Smokefree goal (97.7% vs 95.5%,  $p=.020$ ); there were no significant differences between participants, based on age, with regards to awareness of the goal (46.7% vs 48.8%,  $p=.427$ ), thoughts that it can be achieved (88.1% vs 89.9%,  $p=.369$ ) or that e-cigarettes/vaping can help achieve it (88.0% vs 88.1%,  $p=.965$ ) (**Table 3**).

		18 to 20 years	21 to 24 years	Total	P-value
Before today, were you aware of the Smokefree goal?	Yes	418 (46.7)	266 (48.8)	684 (47.5)	.427
	No	478 (53.3)	279 (51.2)	757 (52.5)	
	Total	896 (100.0)	545 (100.0)	1441 (100.0)	
Do you support this goal?	Definitely/somewhat yes	824 (97.7)	485 (95.5)	1309 (96.9)	.020
	Other*	19 (2.3)	23 (4.5)	42 (3.1)	
	Total	843 (100.0)	508 (100.0)	1351 (100.0)	
Do you think this goal can be achieved?	Definitely/somewhat yes	565 (88.1)	358 (89.9)	923 (88.8)	.369
	Other*	76 (11.9)	40 (10.1)	116 (11.2)	
	Total	641 (100.0)	398 (100.0)	1039 (100.0)	
Do you think e-cigarettes/vaping can help achieve this goal?	Definitely/somewhat yes	596 (88.0)	371 (88.1)	967 (88.1)	.965
	Other*	81 (12.0)	50 (11.9)	131 (11.9)	
	Total	677 (100.0)	421 (100.0)	1098 (100.0)	

\*Includes those who said not really, definitely not, and no opinion.

### Awareness and thoughts, by gender

Females were significantly more likely than males to think that the Smokefree goal can be achieved (92.1% vs 83.4%,  $p<.001$ ); the differences regarding the awareness (45.6% vs 50.5%,  $p=.065$ ), support (97.5% vs 95.8%,  $p=.086$ ), and thoughts that e-cigarettes/vaping can help achieve it (88.7% vs. 87.2%,  $p=.459$ ) were not significantly different, based on gender (**Table 4**).

		Male	Female	Total	P-value
Before today, were you aware of the Smokefree goal?	Yes	279 (50.5)	405 (45.6)	684 (47.5)	.065
	No	273 (49.5)	484 (54.4)	757 (52.5)	
	Total	552 (100.0)	889 (100.0)	1441 (100.0)	
Do you support this goal?	Definitely/somewhat yes	484 (95.8)	825 (97.5)	1309 (96.9)	.086
	Other*	21 (4.2)	21 (2.5)	42 (3.1)	
	Total	505 (100.0)	846 (100.0)	1351 (100.0)	
Do you think this goal can be achieved?	Definitely/somewhat yes	327 (83.4)	596 (92.1)	923 (88.8)	<.001
	Other*	65 (16.6)	51 (7.9)	116 (11.2)	
	Total	392 (100.0)	647 (100.0)	1039 (100.0)	
Do you think e-cigarettes/vaping can help achieve this goal?	Definitely/somewhat yes	388 (87.2)	579 (88.7)	967 (88.1)	.459
	Other*	57 (12.8)	74 (11.3)	131 (11.9)	
	Total	445 (100.0)	653 (100.0)	1098 (100.0)	

\*Includes those who said not really, definitely not, and no opinion.

## Awareness and thoughts, by ethnicity

There were no statistically significant differences between Māori and non-Māori in the awareness of the Smokefree goal (54.0% vs 46.9%,  $p=.149$ ), support for it (95.9% vs 97.0%,  $p=.564$ ), thoughts that it can be achieved (87.1% vs 89.0%,  $p=.641$ ), and thoughts that e-cigarettes/vaping can help achieve it (87.2% vs 88.1%,  $p=.798$ ) (Table 5).

Table 5. Awareness of, support, and thoughts on the Smokefree2025 goal; by Ethnicity					
		Māori	Non-Māori	Total	P-value
Before today, were you aware of the Smokefree goal?	Yes	61 (54.0)	623 (46.9)	684 (47.5)	.149
	No	52 (46.0)	705 (53.1)	757 (52.5)	
	Total	113 (100.0)	1328 (100.0)	1441 (100.0)	
Do you support this goal?	Definitely/somewhat yes	94 (95.9)	1215 (97.0)	1309 (96.9)	.564
	Other*	4 (4.1)	38 (3.0)	42 (3.1)	
	Total	98 (100.0)	1253 (100.0)	1351 (100.0)	
Do you think this goal can be achieved?	Definitely/somewhat yes	61 (87.1)	862 (89.0)	923 (88.8)	.641
	Other*	9 (12.9)	107 (11.0)	116 (11.2)	
	Total	70 (100.0)	969 (100.0)	1039 (100.0)	
Do you think e-cigarettes/vaping can help achieve this goal?	Definitely/somewhat yes	75 (87.2)	892 (88.1)	967 (88.1)	.798
	Other*	11 (12.8)	120 (11.9)	131 (11.9)	
	Total	86 (100.0)	1012 (100.0)	1098 (100.0)	

\*Includes those who said not really, definitely not, and no opinion.

## Awareness and thoughts, by smoking status

Current smokers were significantly more likely than non-current smokers to be aware of the Smokefree goal (58.4% vs 46.2%,  $p=.005$ ), but less likely to support it (85.8% vs 97.8%,  $p<.001$ ), to think it can be achieved (62.2% vs 91.6%,  $p<.001$ ), and to think that e-cigarettes/vaping can help achieve it (77.5% vs 89.2%,  $p=.001$ ) (Table 6).

Table 6. Awareness of, support, and thoughts on the Smokefree2025 goal; by Smoking status					
		Do you currently smoke?*		Total	P-value
		Yes	No		
Before today, were you aware of the Smokefree goal?	Yes	87 (58.4)	597 (46.2)	684 (47.5)	.005
	No	62 (41.6)	695 (53.8)	757 (52.5)	
	Total	149 (100.0)	1292 (100.0)	1441 (100.0)	
Do you support this goal?	Definitely/somewhat yes	91 (85.8)	1218 (97.8)	1309 (96.9)	<.001
	Other**	15 (14.2)	27 (2.2)	42 (3.1)	
	Total	106 (100.0)	1245 (100.0)	1351 (100.0)	
Do you think this goal can be achieved?	Definitely/somewhat yes	61 (62.2)	862 (91.6)	923 (88.8)	<.001
	Other**	37 (37.8)	79 (8.4)	116 (11.2)	
	Total	98 (100.0)	941 (100.0)	1039 (100.0)	
Do you think e-cigarettes/vaping can help achieve this goal?	Definitely/somewhat yes	79 (77.5)	888 (89.2)	967 (88.1)	.001
	Other**	23 (22.5)	108 (10.8)	131 (11.9)	
	Total	102 (100.0)	996 (100.0)	1098 (100.0)	

\*Current smokers are participants who smoked at least once a month. \*\*Includes those who said not really, definitely not, and no opinion.

DISCUSSION

We found strong support for the Smokefree 2025 goal, and belief that it can be achieved, and that e-cigarettes/vaping can help achieve it, despite low awareness of the goal among participants. The awareness was stronger in current smokers (smokers) than non-current smokers (non-smokers); support was stronger in younger than older participants and in non-smokers than smokers; belief that the goal can be achieved was stronger in females than in males and in non-smokers than in smokers, and thoughts that e-cigarettes/vaping can help achieve it were stronger in non-smokers than in smokers.

This study is susceptible to the limitations of the baseline study.<sup>9</sup> These include a non-random sample (because of lack of access to complete lists of students enrolled at NZ universities) that may have put the study at increased risk of volunteer bias. This bias could lead to underestimation or overestimation of prevalence. However, the baseline study weighted the data (used in the current paper), to address this. There could also be some overlap between smokers and vapers: for example, some smokers could also be vapers, or they could be non-vapers, and some non-smokers could be vapers. However,

investigating the extent of the overlap between smoking and vaping would be difficult since majority of people who vape also smoke.

Compared with the findings of Year 10 students, this paper reports slightly higher awareness of the goal (47.5% vs 45%), and substantially higher support for it (96.9% vs 80%).<sup>5</sup> Māori were more likely than non-Māori to be aware in our study (54.0% vs 46.9%), while in Year 10 students, Māori were less likely than non-Māori to be aware of the goal (72% vs 83%).<sup>5</sup> The ethnicity-specific differences in awareness of the goal may be explained by differences in socio-economic characteristics of Māori students in the two surveys. Although primary and secondary education is free in NZ,<sup>16</sup> tertiary education is not. Māori students in our sample are likely to come from less deprived backgrounds (i.e. families with higher education, higher income and healthier social networks), and are less likely to smoke, than Māori students in the Year 10 survey.

Smokers are generally expected to be aware of policies and interventions that have a direct impact on them. This argument is supported by our finding of smokers being significantly more likely to report awareness of the Smokefree goal than non-smokers (58.4% vs 46.2%,  $p=.005$ ). However, smokers were significantly less optimistic than non-smokers about achievability of the goal (62.2% vs. 91.6%,  $p<.001$ ), consistent with 2012 data from Year 10 students that found never smokers more likely to think the Smokefree goal can be achieved compared with current or ex-smokers (37% vs. 32%).<sup>10</sup> Follow-up data may help us to understand why smokers seem more pessimistic about achievement of the goal.

The main strength of this study lies in its relatively large sample that was closely similar to the general university student population in terms of student type, ethnicity and gender (**Table 2**). This makes our results potentially generalizable to the wider university student population.



1 The implications of our findings are twofold. Firstly, they suggest that more work might be needed to  
2  
3 raise awareness of the Smokefree goal among students (and the general population). This could be  
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5 through comprehensive mass media campaigns that reach the wider population over prolonged periods<sup>17</sup>  
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7 as well as targeted adverts/posts on media platforms that are popular with students.<sup>18, 19</sup> Furthermore,  
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9 Smokefree 2025 material and cessation services could be included in orientation packs for new students.  
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11 Secondly, our findings suggest strong support for the goal, and optimism that it can be achieved. This  
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13 calls for ongoing data collection to engage with the public and continuously monitor progress on the  
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15 Smokefree goal.  
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22 **CONCLUSIONS**

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24 Results indicate that the majority of respondents supported the Smokefree 2025 goal, believed that it  
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26 can be achieved, and that e-cigarettes/vaping can help achieve it. The level of awareness was, however,  
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28 disappointing and this calls for a new push to publicise this unique public health policy across the  
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30 student community, and the public. Future surveys should help us to see if increased awareness changes  
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32 attitudes towards a smokefree future.  
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41  
42 in-person data collection process.  
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46  
47 **Contributors** BW (PhD student) planned the study, collected and analysed data, and wrote the  
48  
49 manuscript. MW-B, AR and RCG are BW’s supervisors and contributed to the planning, study design  
50  
51 and writing the manuscript. PC contributed to the study design, data collection, data weighting and  
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53 analysis.  
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STROBE Statement—Checklist of items that should be included in reports of *cross-sectional studies*

	Item No	Recommendation	Page No
Title and abstract	1	(a) Indicate the study’s design with a commonly used term in the title or the abstract	1
		(b) Provide in the abstract an informative and balanced summary of what was done and what was found	2,3
Introduction			
Background/rationale	2	Explain the scientific background and rationale for the investigation being reported	4,5
Objectives	3	State specific objectives, including any prespecified hypotheses	5
Methods			
Study design	4	Present key elements of study design early in the paper	5,6
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	5,6
Participants	6	(a) Give the eligibility criteria, and the sources and methods of selection of participants	5,6
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable	6,7
Data sources/ measurement	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group	6,7
Bias	9	Describe any efforts to address potential sources of bias	
Study size	10	Explain how the study size was arrived at	5,6
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why	6,7
Statistical methods	12	(a) Describe all statistical methods, including those used to control for confounding	7,8
		(b) Describe any methods used to examine subgroups and interactions	
		(c) Explain how missing data were addressed	
		(d) If applicable, describe analytical methods taking account of sampling strategy	
		(e) Describe any sensitivity analyses	
Results			
Participants	13*	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed	8,9
		(b) Give reasons for non-participation at each stage	
		(c) Consider use of a flow diagram	
Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders	8,9
		(b) Indicate number of participants with missing data for each variable of interest	9-12
Outcome data	15*	Report numbers of outcome events or summary measures	9-12
Main results	16	(a) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included	

		(b) Report category boundaries when continuous variables were categorized	
		(c) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period	
Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses	
<b>Discussion</b>			
Key results	18	Summarise key results with reference to study objectives	12
Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias	12,13
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence	13
Generalisability	21	Discuss the generalisability (external validity) of the study results	13
<b>Other information</b>			
Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based	15

\*Give information separately for exposed and unexposed groups.

**Note:** An Explanation and Elaboration article discusses each checklist item and gives methodological background and published examples of transparent reporting. The STROBE checklist is best used in conjunction with this article (freely available on the Web sites of PLoS Medicine at <http://www.plosmedicine.org/>, Annals of Internal Medicine at <http://www.annals.org/>, and Epidemiology at <http://www.epidem.com/>). Information on the STROBE Initiative is available at [www.strobe-statement.org](http://www.strobe-statement.org).

# BMJ Open

## Attitudes towards the New Zealand Government's Smokefree 2025 Goal associated with smoking and vaping in university students aged 18-24 years: results of a 2018 national cross-sectional survey.

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## Title page

**Title:** Attitudes towards the New Zealand Government's Smokefree 2025 Goal associated with smoking and vaping in university students aged 18-24 years: results of a 2018 national cross-sectional survey.

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**Word count:** 3,600 (excluding title page, abstract, figures, tables and references).



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**ABSTRACT**

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**Objective**

In March 2011, New Zealand (NZ) launched an aspirational goal to reduce smoking prevalence to 5% or less by 2025 (Smokefree 2025 goal). Little is known about university students’ awareness of, support for, and perceptions about this goal. We sought to narrow the knowledge gap.

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**Setting**

University students in NZ.

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**Methods**

We analysed data from a 2018 cross-sectional survey of university students across NZ. Logistic regression analysis examined the associations between responses about the Smokefree goal with smoking and vaping, while controlling for age, sex and ethnicity. Confidence intervals (95% CI) were reported where appropriate.

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**Participants**

The sample comprised 1,476 students: 919 (62.3%) aged 18-20, 557 (37.7%) aged 21-24 years; 569 (38.6%) male, 907 (61.4%) female; 117 (7.9%) Māori and 1,359 (92.1%) non-Māori. Of these, 10.5% currently smoked (i.e. smoked at least monthly) and 6.1% currently vaped.

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**Results**

Overall awareness of the Smokefree goal was 47.5% (95% CI: 44.9-50.1); support 96.9% (95% CI: 95.8-97.8); belief that it can be achieved 88.8% (95% CI: 86.8-90.7) and thoughts that e-cigarettes/vaping can help achieve it 88.1% (95% CI: 86.0-89.9).

Dual users of tobacco cigarettes and e-cigarettes had greater odds of being aware of the Smokefree goal (OR = 3.07, 1.19-7.92), current smokers had lower odds of supporting it (OR = 0.13, 0.06-0.27) and of believing that it can be achieved (OR = 0.15, 0.09-0.24) and current vapers had greater odds of believing that e-cigarettes/vaping can help to achieve it (OR = 8.57, 1.18-62.52) compared with non-users.

## Conclusions

The results suggest strong overall support for the Smokefree goal and belief that it can be achieved and that e-cigarettes/vaping can help achieve it. Smoking and vaping were associated with awareness of the goal, but lower support and optimism that it can be achieved.

## Strengths and limitations of this study

- This is the first study in NZ to assess the Smokefree 2025 goal: awareness, support, achievability and role of e-cigarettes/vaping, in university students.
- The sample was weighted by sex and university size to improve its representation of the general university student population.
- The main limitation of this study is that a convenience sample was used, which increases the risk of volunteer bias.

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INTRODUCTION

Smoking is a leading cause of preventable death and illness in New Zealand (Aotearoa New Zealand or NZ) and causes an estimated 5,000 deaths annually.<sup>1</sup> Smoking also plays a major role in the inequalities in health and wellbeing between Māori and non-Māori.<sup>2</sup> Furthermore, the economic consequences of smoking are significant<sup>3</sup> and have a huge impact on society, particularly on the poor. For these reasons, tobacco control has been a major social and health policy in NZ.

The overall prevalence of current smoking (i.e. smoking at least once a month) in adults aged 15 years or older in NZ is estimated at 14.2%.<sup>4</sup> Māori (the Indigenous people of NZ) have the highest prevalence of smoking at 34% (Pasifika peoples 24.4%, NZ European/Other 12.4% and Asian 8.4%).<sup>4</sup> People aged 35-44 (19.8%), 18-24 (19.2%) and 25-34 (18.3%) have among the highest prevalences of smoking in NZ, with the lowest prevalence in people aged 15-17 years (3.8%).<sup>4</sup> A recent study using 2018 data from a representative sample of students from all eight universities in NZ found 11.1% of respondents aged 18-24 years were current smokers.<sup>5</sup> This estimate was substantially lower than that of individuals aged 18-24 in the general population (19.2%).<sup>6</sup>

In March 2011, the NZ Government adopted the Smokefree Aotearoa 2025 goal (Smokefree 2025 goal or Smokefree goal), which aims to reduce the prevalence of smoking to 5% or less by the year 2025.<sup>7</sup> The Government outlined three main approaches to achieve smokefree aspirations: (1) protect children from exposure to tobacco marketing and promotion, (2) reduce the supply of, and demand for tobacco, and (3) provide the best possible support for quitting smoking.

Over the last decade, using Smokefree Environments legislation, the Government has put in place a number of measures to reduce smoking, notably an annual 10% tobacco tax increase,<sup>8</sup> restrictions on

the display of tobacco in retail outlets and in recent years, a softer approach to electronic cigarette or e-cigarette use (vaping) to encourage smokers to transition to vaping and/or quit smoking. The Ministry of Health has been supportive of vaping being used as part of harm reduction<sup>9</sup> and in June 2019 it launched a website to provide “credible” information about vaping to New Zealanders.<sup>10</sup> Until recently (27 March 2018),<sup>11</sup> it was illegal to sell nicotine-containing e-cigarettes in NZ but individuals could import small amounts (up to a three-month supply) for personal use. In 2018/19 the overall prevalence of current vaping (i.e. vaping at least once a month) in NZ was estimated at 4.7% (8.8% in people aged 18-24 years)<sup>4</sup> and 6.1% in university students aged 18-24 years.<sup>12</sup>

Literature on the Smokefree goal (awareness, support, perceptions on its achievability, and the potential role of e-cigarettes or vaping) is however lacking. Available data come from the 2018 Youth Insights Survey (YIS), which included 2,758 Year 10 students (predominantly ages 14 and 15 years) from across the country.<sup>13</sup> The YIS forms part of the New Zealand Youth Tobacco Monitor (NZYTM), a collaborative effort by the Health Promotion Agency (HPA) and Action on Smoking and Health (ASH).<sup>14</sup>

In 2018, 45% of Year 10 students were aware of the Smokefree goal, but significant disparities were present across the predominant ethnic groups.<sup>13</sup> Students who identified as NZ European/Other were more likely to be aware of the goal, while Pacific students were less likely to be aware of the goal, 80% of the students supported the goal, with higher support among non-Māori and non-Pacific (82%) compared with Māori (72%) and Pacific (67%) students.<sup>13</sup> The report used prioritised ethnicity, where each participant was assigned to a single ethnic group based on the ethnicities that they identified with, in the prioritised order of Māori, Pacific, Asian and European/Other.<sup>13</sup> Support for the goal was higher in females than males (83% vs. 78%), never smokers than ex-smokers and current smokers (86% vs. 69% and 32%), and students attending high decile (86%) and medium decile (80%) schools, compared

1 with those at low decile schools (70%).<sup>13</sup> School deciles are a measure of the socio-economic position  
2 of a school's student community relative to other schools throughout the country, for example, decile 1  
3 schools are the 10% of schools with the highest proportion of students from low socio-economic  
4 communities, whereas decile 10 schools are the 10% of schools with the lowest proportion of students  
5 from low socio-economic communities.<sup>15</sup> In 2018, 5.0% of Year 10 students were current smokers and  
6 1.9% smoked daily.<sup>16</sup>

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19 The current paper examines the associations between responses about the Smokefree goal (awareness,  
20 support, belief that it can be achieved, and that e-cigarettes/vaping can help to achieve it) with smoking,  
21 vaping, age, sex and ethnicity in university students aged 18-24. The Smokefree goal is an essential  
22 component of the NZ health policy and we hope that our findings will provide vital data that could assist  
23 policymakers in tobacco control in NZ and beyond.

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34 **METHODS**

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37 Data were obtained from a national cross-sectional survey of university students in NZ in March-May  
38 2018. The survey collected data on cigarette smoking, vaping, the Smokefree 2025 goal, and participant  
39 health in the previous 12 months.<sup>5, 12, 17</sup> A convenience sample had to be used, rather than a random  
40 sample, because complete enrolment lists of students were not available from the universities, due to  
41 concerns about privacy issues.

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51 We acknowledge the limitations of using a convenience sample, including increased risk of volunteer  
52 bias, which could lead to underestimation, or overestimation of certain prevalence estimates. We  
53 weighted data based on sex of participants (male or female) and university size (representation in our  
54 sample relative to university size as per the Ministry of Education data).<sup>18</sup>

The study was reviewed and approved by the University of Canterbury Human Ethics Committee (research ethics ID: HEC 2017/42/LR-PS) and the University of Canterbury Māori Research Advisory Group.

## The survey

Information about the project, including its objectives, eligibility and how to participate, and a URL link that allowed participants to complete the survey online on a computer or smart phone was distributed widely on student platforms (including Facebook). Furthermore, research assistants (RAs) from participating universities approached students on campus (in libraries, cafes, halls of residence) and invited them to complete the survey on paper (printed questionnaire) or online by scanning a QR code using smart phones. Training was provided to RAs prior to deployment and supervision and support were provided throughout the data collection process. All efforts were made to have a minimum of two and a maximum of six RAs per university, depending on university size, stationed at different colleges or campuses to capture data from diverse participants.

To be eligible, participants had to be enrolled in at least one university in NZ. Participants were also required to answer “Yes” to the question “Do you agree to take part in this survey?” before completing the survey. Participants taking the survey online could not proceed without a “Yes” response to this question, while all participants who completed the survey on paper were deemed to have consented even if they did not provide a response.<sup>12</sup>

Participants, regardless of survey route (online or paper) could opt to enter into a draw to win one of ten NZD100 cash prizes after completing the survey as a token of appreciation for participation.<sup>12</sup> Data were de-identified before analysis, and duplicate entries in the online survey were removed with the help of the Internet Protocol address (IP) address.<sup>12</sup> Additional information on sampling, sample size and procedures used is available elsewhere.<sup>5, 12</sup>

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**Participants**

The current analysis is a continuation of work using a dataset of responses from participants aged 18-24 years<sup>5, 12</sup> which allowed for comparisons on smoking and vaping to be made with estimates from population surveys that use a similar age band.<sup>4</sup> This dataset contains 1,476 participants who met the criteria for inclusion in the current analysis, and data on their demographic information and Smokefree 2025 questions were used.

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**Patient and public involvement**

No patients were involved in this project; university students were surveyed.

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**Survey measures**

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Demographic variables:

Ethnicity data were prioritised for Māori: all those who selected Māori were defined as Māori and those who did not select Māori were defined as non-Māori, similar to previous research.<sup>13</sup> This was necessary because of small numbers of Pasifika students. Years lived in NZ (five or less) was used as proxy for international students, based on our previous work.<sup>5</sup> Participants could select one or more of the eight universities in NZ: Auckland University of Technology, Lincoln University, Massey University, University of Auckland, University of Canterbury, University of Otago, University of Waikato and Victoria University of Wellington. This variable helped us to assess the representativeness of the sample based on university size.

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The Smokefree 2025 Goal:

A brief description of the Smokefree 2025 goal was provided before the first question that asked, “The New Zealand Government wants to reduce the proportion of people who smoke from around 16% (1 in 6) currently to less than 5% (1 in 20) by 2025. This is the Smokefree 2025 Goal. Before today, were

you aware of this goal?" The response options were "Yes" and "No". This question has been validated previously.<sup>19, 20</sup>

Participants were also asked (1) "Do you support this goal?" (2) "Do you think this goal can be achieved?" (3) "Do you think e-cigarettes/vaping can help achieve this goal?" The response options for the three questions were "Definitely yes", "Somewhat yes", "Not really", "Definitely not", and "No opinion". These were later grouped into two levels, "Definitely/somewhat yes" and "Other". Other included those who said not really, definitely not and no opinion. This was done because of small numbers for the responses included in "Other".

#### Smoking and Vaping:

Participants were asked, "Have you ever smoked cigarettes or tobacco at all, even just a few puffs" and those who answered "Yes" to this question were asked, "Which of the following best describes how often you smoke cigarettes or tobacco now?" and response options were "At least once a day", "At least once a week", "At least once a month", and "Less often than once a month". Those who reported smoking at least once a month or more frequently were defined as "current smokers," consistent with previous research.<sup>5, 21, 22</sup> This question was adapted from Marsh *et al.*<sup>23</sup> and the NZ Tobacco Use Survey.<sup>24</sup>

Participants were also asked about their e-cigarette use. Respondents who answered "Yes" to the question, "Have you ever tried an e-cigarette or vaping device?" were described as "ever vapers" and asked, "How often do you currently use an e-cigarette or vaping device?" The response options were "Daily or almost daily", "Less than daily, but at least once a week", "Less than weekly, but at least once a month", "Less than monthly", "Not at all" and "Don't know". Those who reported vaping at least once a month or more frequently were defined as "current vapers," consistent with previous studies.<sup>12, 25-28</sup> The question was adapted from Pearson and others.<sup>29</sup>



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Respondents were grouped into four groups: (1) current smoker and current vapor (dual user), (2) current smoker and non-current vapor (current smoker), (3) current vapor and non-current smoker (current vapor), and (4) non-current smoker and non-current vapor (non-user).

**Data analysis**

Logistic regression analysis examined the associations between responses to questions about the Smokefree 2025 goal with smoking and vaping, while controlling for age, sex and ethnicity. All statistical analyses were performed using IBM SPSS Statistics version 25 and two-sided  $p<.05$  was considered statistically significant. Confidence intervals (95% CI) were reported where appropriate.

**RESULTS**

Tables one and two have been adapted from our previous work. Table one shows the characteristics of the sample, which comprised 1,476 students: 62.3% were aged 18-20, 61.4% female, 92.1% non-Māori, 78.9% had lived in NZ for six years or more, 10.5% current smokers, and 6.1% current vapers. Table two compares the characteristics of participants included in this paper with those of the 2018 NZ university student population.

**Table 1. Demographic characteristics of participants<sup>5, 12</sup>**

Variable	Sample (n = 1,476) %
<b>Age</b>	
18-20 years	919 (62.3)
21-24 years	557 (37.7)
<b>Sex</b>	
Male	569 (38.6)
Female	907 (61.4)
<b>Ethnicity</b>	
Māori	117 (7.9)
Non-Māori	1,359 (92.1%)
<b>Years lived in NZ</b>	
<6 years	307 (20.8)
≥6 years	1,471 (78.9)
Missing data	5 (.3)
<b>Currently smoke</b>	
Yes	155 (10.5%)
No	1321 (89.5%)
<b>Currently vape</b>	
Yes	90 (6.1%)
No	1386 (93.9%)

**Table 2. Characteristics of students in this study vs NZ university students in 2018.<sup>5, 12</sup>**

		This paper (%)	NZ university student population (%) <sup>*</sup>
Student type	Domestic	79.2 <sup>a</sup>	82.0
	International	20.8 <sup>a</sup>	18.0
Ethnicity	Māori	7.9	9.6
	Non-Māori	92.1	90.4
Sex	Male	38.6	41.8
	Female	61.4	58.2

<sup>a</sup>We used the time lived in NZ as proxy for defining domestic students (having lived in NZ for ≥6 years) and international students

(having lived in NZ for <6 years). \*Source: Ministry of Education.<sup>18</sup> Data extracted from Excel sheets ENR.31, ENR.32 and ENR.34.

## Overall awareness and thoughts

Among those who responded, 684 (47.5%, 95% CI: 44.9-50.1) were aware of the Smokefree goal before completing the survey (97.6% response rate); 1309 (96.9%, 95% CI: 95.8-97.8) supported it (91.5% response rate); 923 (88.8%, 95% CI: 86.8-90.7) thought it can be achieved (70.4% response rate), and 967 (88.1%, 95% CI: 86.0-89.9) thought e-cigarettes/vaping can help achieve it (74.4% response rate).

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### Logistic regression analysis

Logistic regression models were used to investigate the associations between responses about the Smokefree 2025 goal with smoking and vaping, while controlling for age, sex and ethnicity. The predictor variables were coded as: smoking and vaping status (1 = dual user, 2 = current smoker, 3 = current vaper, 4 = non-user), age (0 = 18-20 years, 1 = 21-24 years), sex (0 = female, 1 = male) and ethnicity (0 = Māori, 1 = Non-Māori).

The outcome variables were coded as: awareness of the Smokefree goal (0 = No, 1 = Yes), support for the Smokefree goal (0 = “other”, 1 = “definitely/somewhat yes”), belief that the Smokefree goal can be achieved (0 = “other”, 1 = “definitely/somewhat yes”) and belief that e-cigarettes/vaping can help to achieve the Smokefree goal (0 = “other”, 1 = “definitely/somewhat yes”).

### Awareness of the Smokefree goal

The model, with 1441 cases included (35 missing cases), containing all predictors (age, sex, ethnicity, current smoking, current vaping and dual use) was significant,  $\chi^2$  (6, N = 1441) = 23.585,  $p$  = .001, indicating that the model was able to distinguish between respondents who were aware and who were unaware of the Smokefree goal.

As shown in **Table 3**, only current smoking, current vaping and dual use made a unique significant contribution to the model. The strongest predictor of reporting awareness of the Smokefree goal was dual use, which had an odds ratio of 3.07 (95% CI 1.19-7.92) implying that for dual users the odds of being aware of the Smokefree goal was over three times that for non-users.

Table 3. Logistic regression model predicting likelihood of being aware of the Smokefree goal.						
	B	S.E.	p	Odds Ratio	95% CI for Odds Ratio	
					Lower	Upper
Age	.054	.110	.622	1.056	.851	1.310
Sex	.131	.111	.236	1.140	.918	1.417
Ethnicity	-.254	.199	.201	.776	.526	1.145
SmokingAndVapingStatus			.001			
SmokingAndVapingStatus(1)	1.120	.484	.021	3.066	1.186	7.921
SmokingAndVapingStatus(2)	.391	.190	.039	1.479	1.020	2.144
SmokingAndVapingStatus(3)	.779	.266	.003	2.179	1.294	3.670

SmokingAndVapingStatus: (1) dual user, (2) current smoker, (3) current vaper.

## Support for the Smokefree goal

The model, with 1351 cases included (125 missing cases) containing all predictors was significant,  $\chi^2$  (6, N = 1351) = 34.236,  $p < .001$ , indicating that the model was able to distinguish between respondents who supported and who did not support the Smokefree goal.

As shown in **Table 4**, only current smoking made a unique significant contribution to the model, with an odds ratio of 0.13 (95% CI 0.06-0.27) implying that for current smokers the odds of supporting the Smokefree goal was significantly lower than that for non-users. Equivalently (and possibly easier to interpret), participants who were neither current smokers nor current vapers had odds of 7.69 (=1/0.13) with 95% CI 3.70-16.67 of supporting the Smokefree goal compared with participants who were current smokers.

	B	S.E.	p	Odds Ratio	95% CI for Odds Ratio	
					Lower	Upper
Age	-.614	.324	.058	.541	.287	1.022
Sex	-.229	.329	.487	.795	.417	1.516
Ethnicity	.229	.553	.680	1.257	.425	3.719
SmokingAndVapingStatus			.000			
SmokingAndVapingStatus(1)	-1.153	1.069	.281	.316	.039	2.568
SmokingAndVapingStatus(2)	-2.041	.366	.000	.130	.063	.266
SmokingAndVapingStatus(3)	-.880	.633	.164	.415	.120	1.433

SmokingAndVapingStatus: (1) dual user, (2) current smoker, (3) current vaper.

## Belief that Smokefree goal can be achieved

The model, with 1039 cases included (437 missing cases), containing all predictors was significant,  $\chi^2$  (6, N = 1039) = 70.539,  $p < .001$ , indicating that the model was able to distinguish between respondents who believed and who did not believe that the Smokefree goal could be achieved.

As shown in **Table 5**, only sex, current smoking and dual use made a unique significant contribution to the model. The strongest predictor of believing that the Smokefree goal can be achieved was current smoking, which had an odds ratio of 0.15 (95% CI 0.09-0.24) implying that for current smokers the odds of believing that the Smokefree goal can be achieved was significantly lower than that for non-users. Equivalently (and possibly easier to interpret), participants who were neither current smokers nor current vapers had odds of 6.67 (=1/0.15) with 95% CI 4.17-11.1 of believing that the Smokefree goal can be achieved compared with participants who were current smokers.

Table 5. Logistic regression model predicting likelihood of believing that the Smokefree goal can be achieved.						
	B	S.E.	p	Odds Ratio	95% CI for Odds Ratio	
					Lower	Upper
Age	.349	.221	.114	1.418	.919	2.187
Sex	-.688	.209	.001	.503	.334	.757
Ethnicity	.127	.394	.746	1.136	.525	2.458
SmokingAndVapingStatus			.000			
SmokingAndVapingStatus(1)	-1.411	.704	.045	.244	.061	.968
SmokingAndVapingStatus(2)	-1.920	.257	.000	.147	.089	.243
SmokingAndVapingStatus(3)	-.565	.465	.224	.568	.228	1.413

SmokingAndVapingStatus: (1) dual user, (2) current smoker, (3) current vaper.

**Belief that e-cigarettes/vaping can help to achieve the Smokefree goal**

The model, with 1098 cases included (378 missing cases), containing all predictors was significant,  $\chi^2$  (6, N = 1098) = 31.433,  $p < .001$ , indicating that the model was able to distinguish between respondents who believed and who did not believe that e-cigarettes/vaping can help to achieve the Smokefree goal.

As shown in **Table 6**, only current smoking and current vaping made a unique significant contribution to the model. The strongest predictor of believing that e-cigarettes/vaping can help to achieve the Smokefree goal was current vaping, which had an odds ratio of 8.57 (95% CI 1.18-62.52) implying that for current vapers the odds of believing that e-cigarettes/vaping can help to achieve Smokefree goal was over eight times that for non-users.

Table 6. Logistic regression model predicting likelihood of believing that e-cigarettes/vaping can help to achieve the Smokefree goal.						
	B	S.E.	p	Odds Ratio	95% CI for Odds Ratio	
					Lower	Upper
Age	.001	.195	.994	1.001	.683	1.468
Sex	-.127	.193	.510	.880	.603	1.286
Ethnicity	.113	.343	.742	1.120	.571	2.194
SmokingAndVapingStatus			.000			
SmokingAndVapingStatus(1)‡						
SmokingAndVapingStatus(2)	-1.073	.269	.000	.342	.202	.579
SmokingAndVapingStatus(3)	2.148	1.014	.034	8.569	1.175	62.520

SmokingAndVapingStatus: (1) dual user, (2) current smoker, (3) current vaper. ‡ Maximum likelihood estimates were unable to be calculated for dual users because of quasi-complete separation in the data. This was because all 20 dual users responded that e-cigarettes/vaping can help to achieve the Smokefree goal.

## DISCUSSION

We found strong support for the Smokefree 2025 goal, and belief that it can be achieved and that e-cigarettes/vaping can help achieve it, despite low overall awareness of the goal among participants. Smokers and dual users had greater odds of being aware of the goal but lower odds of supporting it or of believing that it can be achieved compared with participants who neither smoked nor vaped (non-users). Females had greater odds of believing that the goal can be achieved and vapers and non-smokers had greater odds of believing that e-cigarettes/vaping can help achieve it.

At a local level, this paper reports slightly higher awareness of the Smokefree goal (47.5% vs 45%) and substantially higher support for it (96.9% vs 80%), compared with the findings for Year 10 students.<sup>13</sup>

At an international level, the percent supporting the Smokefree goal reported in our study was nearly three times the support for a “complete ban on use or sale of tobacco” (34.9%) reported in a 2010 study of 18 European countries.<sup>30</sup> In both studies smokers were less likely to support smokefree propositions. The questions used in these studies were however not exactly similar or interchangeable: our study assessed support for an “existing policy” that seeks to reduce the prevalence of smoking to 5% or less<sup>7</sup> whereas the European study assessed support for a “hypothetical policy” that could make smoking or cigarette sales illegal.<sup>30</sup>

In logistic regression analysis, ethnicity did not make any significant contribution to the models in the current study. This result was unexpected considering that Māori generally have higher prevalence of smoking<sup>4</sup> and would therefore be expected to have greater awareness of the Smokefree goal and any associated implications for smokers (i.e. increasing cost of tobacco products), compared with non-Māori.

Smokers would generally be expected to be aware of policies and interventions that have a direct impact on them. This argument is supported by our finding of greater odds of awareness of the Smokefree goal

1 among smokers and dual users compared with participants who neither smoked nor vaped. Consistent  
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4 with 2012 data from Year 10 students,<sup>19</sup> smokers were less optimistic about the achievability of the  
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6 Smokefree goal. Follow-up data may be necessary to help us understand why smokers seem less  
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8 optimistic about a smokefree future.  
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13 The role of vaping in tobacco control remains controversial with proponents arguing that vaping could  
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15 help reduce smoking and the public health burden of smoking<sup>31-39</sup> and opponents arguing that vaping  
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17 might undermine tobacco control policies and create new nicotine addicts who could then transition to  
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19 smoking.<sup>31, 34, 35, 38</sup> If students are using vaping as a way to stop smoking tobacco cigarettes, then vaping  
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21 may encourage cessation. This was the main reason for the less restrictive regulations in NZ to increase  
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23 access to vaping. We are not aware of any other national study that has investigated attitudes towards  
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25 vaping as a contributor to a tobacco endgame strategy. Besides narrowing the knowledge gap, this  
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27 information is very relevant in NZ and in other countries considering New Zealand's approach on  
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29 vaping. In the current study, vapers and non-smokers had greater odds of believing that e-  
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31 cigarettes/vaping can help to achieve the Smokefree goal. A plausible reason for this finding could be  
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33 that non-smokers viewed vaping more positively than smokers.  
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41 The main strength of this study lies in its relatively large sample that was closely similar to the general  
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43 university student population in terms of student type, ethnicity and sex (**Table 2**). This makes our  
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45 results potentially generalizable to the wider university student population.  
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51 This study has a number of limitations. Firstly, we had to use a convenience sample, which increases  
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53 the risk of volunteer bias that could lead to underestimation or overestimation of prevalence estimates.  
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55 Data were however, weighted to partly address this. Secondly, we did not use any measure of socio-  
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57 economic status (SES), which prevented us from assessing its potential contribution to the reported  
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prevalence estimates. Literature from NZ and elsewhere suggest that people from higher SES groups are more likely to attend university than people from lower SES groups.<sup>40-42</sup>

The implications of our findings are twofold. Firstly, they suggest that more work might be needed to raise awareness of the Smokefree goal among students (and the general population). This could be through comprehensive mass media campaigns that reach the wider population over prolonged periods<sup>43</sup> as well as targeted adverts/posts on media platforms that are popular with students.<sup>44, 45</sup> Furthermore, Smokefree 2025 material and information about cessation services could be included in orientation packs for new students. Secondly, our findings suggest strong support for the goal, and optimism that it can be achieved. This calls for ongoing data collection to engage with the public and continuously monitor progress on the Smokefree goal.

## CONCLUSIONS

The results suggest strong overall support for the Smokefree 2025 goal and belief that it can be achieved and that e-cigarettes/vaping can help to achieve it. Smoking and vaping were associated with strong awareness of the Smokefree goal, but with less support and belief that it can be achieved.

The level of awareness, overall, was however disappointing, and this calls for a renewed push to publicise this unique public health policy in the population (students, and the wider public). Future surveys should help us to understand whether increased awareness changes attitudes towards a smokefree future.

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**Contributors** BW (PhD student) planned the study, collected and analysed data, and wrote the manuscript. MW-B, AR and RCG are BW’s supervisors and contributed to the planning, study design and writing the manuscript. PC contributed to the study design, data collection, data weighting and analysis.

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**Competing Interests** None declared.

**Data sharing statement** No additional data are available.

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STROBE Statement—Checklist of items that should be included in reports of *cross-sectional studies*

	Item No	Recommendation	Page No
Title and abstract	1	(a) Indicate the study’s design with a commonly used term in the title or the abstract	1
		(b) Provide in the abstract an informative and balanced summary of what was done and what was found	2,3
Introduction			
Background/rationale	2	Explain the scientific background and rationale for the investigation being reported	4-6
Objectives	3	State specific objectives, including any prespecified hypotheses	6
Methods			
Study design	4	Present key elements of study design early in the paper	6
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	6, 7
Participants	6	(a) Give the eligibility criteria, and the sources and methods of selection of participants	7
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable	8-10
Data sources/ measurement	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group	8-10
Bias	9	Describe any efforts to address potential sources of bias	
Study size	10	Explain how the study size was arrived at	8
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why	8-10
Statistical methods	12	(a) Describe all statistical methods, including those used to control for confounding	10
		(b) Describe any methods used to examine subgroups and interactions	10
		(c) Explain how missing data were addressed	
		(d) If applicable, describe analytical methods taking account of sampling strategy	
		(e) Describe any sensitivity analyses	
Results			
Participants	13*	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed	10-14
		(b) Give reasons for non-participation at each stage	
		(c) Consider use of a flow diagram	
Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders	10, 11
		(b) Indicate number of participants with missing data for each variable of interest	11-14
Outcome data	15*	Report numbers of outcome events or summary measures	11-14

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Main results	16	(a) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included	11-14
		(b) Report category boundaries when continuous variables were categorized	
		(c) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period	
Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses	
<b>Discussion</b>			
Key results	18	Summarise key results with reference to study objectives	15
Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias	15-17
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence	15-17
Generalisability	21	Discuss the generalisability (external validity) of the study results	16
<b>Other information</b>			
Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based	18

\*Give information separately for exposed and unexposed groups.

**Note:** An Explanation and Elaboration article discusses each checklist item and gives methodological background and published examples of transparent reporting. The STROBE checklist is best used in conjunction with this article (freely available on the Web sites of PLoS Medicine at <http://www.plosmedicine.org/>, Annals of Internal Medicine at <http://www.annals.org/>, and Epidemiology at <http://www.epidem.com/>). Information on the STROBE Initiative is available at [www.strobe-statement.org](http://www.strobe-statement.org).